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(72) Inventors:  
 • **Campione, Gaetano**  
**10040 Volvera (TO) (IT)**  
 • **Cavaglia', Renato**  
**10040 Volvera (TO) (IT)**

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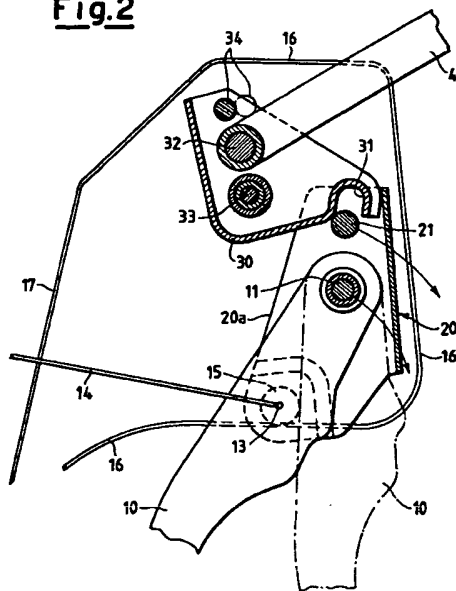
(74) Representative:  
**Lotti, Giorgio et al**  
**c/o Ing. Barzanò & Zanardo Milano S.p.A.**  
**Corso Vittorio Emanuele II, 61**  
**10128 Torino (IT)**

(71) Applicant: **S.I.V. S.p.A.**  
**10040 Volvera (Torino) (IT)**

(54) **A system for releasing the brake pedal in the event of a collision**

(57) In a system for releasing the brake pedal (10) in the event of a collision, the pedal is linked to the body (16) of the vehicle by a bracket (20). A lower portion of the bracket is hinged (15) to the body (16) of the vehicle and an upper portion of the bracket is hooked to a hook member (30) in turn pivotally mounted at a first location (32) to the steering column (40) and secured at a second location (33) to the vehicle. The hook member (30) has a first position, for normal operation, in which it keeps the bracket (20) fixed, and a second position, rotated about the first pivotal connection (32) to the steering column (40) following a collision, in which the bracket (20) is released from the hook member (30) and is free to rotate about the hinged connection (15) to the vehicle. In the second position, the brake pedal is free to rotate until it reaches the front body frame (17).

**Fig.2**



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## Description

### Field of the invention

The present invention refers to a system for releasing the brake pedal in the event of a collision so as to prevent the driver's foot and ankles from damage when the vehicle is in a collision.

### Background of the invention

It has been recently found that in the event of road accidents, particularly frontal collisions, there is an extremely high number of damages caused by the brake pedal. In a collision, the driver's legs, particularly the ankles, are likely to be injured because of the brake pedal that cannot be fully pressed down due to the contrasting action exerted by the servo brake control rod. Therefore, the brake pedal can be regarded as a rigid element dangerously protruding from the pedals zone towards the driver's legs.

A few safety systems have been proposed with the aim of reducing the risk of such damages.

DE-A-43 05 290 discloses a safety system in which the brake pedal is mounted by means of a linked structure that, in the event of a collision, springs back to raise the pedal clear of the foot region.

DE-A-44 09 235 discloses a system wherein the pedal is pivotally mounted on a front bulkhead panel bracket. The top end of the pedal is pinned to a compound linkage coupled to a main cross member. In the event of a collision, the bulkhead frame collapses and displaces the pedal clear of the driver's foot.

DE-A-44 09 324 discloses a cable and pulley system that raises the pedal in the event of a collision.

EP-A-0 659 615 relates to a system in which the brake pedal is supported by two pins respectively secured to a pair of collapsible half-shells. Following a collision, the half-shells collapse and let the pins come off, releasing the pedal and letting it fall down.

### Summary of the invention

It is an object of the present invention to provide an alternative system allowing for the brake pedal to be released in a safe and efficient manner, the system being of simple construction and small overall size.

In accordance with the present invention, this object is accomplished by the provision of a system for releasing the brake pedal in the event of a collision, characterised in that the pedal is linked to the body of the vehicle by a bracket, a lower portion of said bracket being hinged to the body of the vehicle, and an upper portion of the bracket being hooked to a hook member in turn pivotally mounted at a first location to the steering column and secured at a second location to the vehicle; said hook member having a first, normal operation position in which it keeps the bracket fixed, and a

second position, rotated about said first pivotal connection to the steering column following a collision, in which said bracket is released from the hook member and is free to rotate about said hinged connection to the vehicle, whereby the brake pedal is free to rotate until it reaches the front body frame.

### Brief description of the drawings

In order that the present invention may be well understood there will now be described a preferred embodiment thereof, given by way of example, reference being made to the accompanying drawings, in which:

- FIG. 1 is a longitudinal cross sectional view of the safety system in accordance with the present invention, in a first normal operation condition, the brake pedal being hooked;
- FIG. 2 is a longitudinal cross sectional view of the safety system of FIG. 1, the brake pedal being released following a crash; and
- FIGS. 3, 4 and 5 are cross sectional views taken along the lines III-III, IV-IV, and V-V, respectively, of FIG. 1.

### Detailed description of a preferred embodiment

With reference initially to FIG. 1, in accordance with the present invention the brake pedal 10 is not directly connected to a conventional pedals support but is hinged at 11 to a bracket 20 having vertical walls 20a, 20b located at either side of the pedal. The pedal is secured in known manner at 13 to a servo brake control rod schematically designated by reference numeral 14. The lower part of the bracket 20 is hinged at 15 to a support 16 integral with the front body frame 17. The bracket is kept in its normal operation position of FIG. 1 by a hook member 30 engaging the upper part of the bracket 20. As also shown in FIG. 4, the hook 30 forms a pair of rear recesses 31 (on the left and right sides of the pedal), in which there is engaged a pin 21 integral with the bracket 20.

Referring to FIGS. 1 and 5, still in accordance with the present invention the body of hook 30 is pivotally mounted at 32 to the steering column 40 which constitutes, as well known, a considerably rigid member of the vehicle. The position of the pivotal connection 32 can therefore be considered as a fixed point also in the event of a collision. The hook 30 is furthermore secured to the support 16, for example by means of a bolt, at a point 33 located below the point 32 of pivotal connection to the steering column 40.

Operation of the safety system is as follows. In the event of a frontal collision, the front body frame 17 with the support 16 and the parts mounted thereto are forced

backwards (to the right in FIGS. 1 and 2). The rearward movement is transmitted from the support 16 to the hook 30 through pivotal connection 33. However, owing to the contrasting action of the substantially undeformable steering column 40, the pivotal connection 32 becomes a centre of rotation around which the hook 30 rotates (in the counter-clockwise direction looking at FIGS. 1 and 2) so as to lift its own rear end recess 31 and release the pin 21. In this condition, the bracket 20 is free to rotate downwards (in the clockwise direction in FIGS. 1 and 2) about the hinge 15 due to the torque the bracket receives from the pedal 10 through the pin 11. The pressure exerted by the driver's foot on the pedal rotates the pedal about the point 13 of connection to the servo brake control rod, which becomes a fulcrum point for the pedal. Although it remains hinged to the bracket 20, the pedal encounters no resistance in reaching the front body frame 17 and therefore does no longer represent a possible cause of damage to the foot.

Preferably, in order to improve the release of the bracket 20, the hinge 15 is located at a point on the support 16 such that when the pedal is pressed down, the restraining point 13 is substantially coincident with the point 15 at which the bracket 20 is hinged to the vehicle. In such a preferred arrangement, the centres of rotation of the bracket and the pedal lie on the same horizontal axis. This prevents the bracket from jamming, which would hinder the pedal's movement.

In the preferred embodiment, as shown in FIGS. 1 and 2, the hook 30 provides a pair of side pins 34, for example of plastic material, which yield when subjected to a load exceeding about 30 kilograms. Side pins 34 serve as further locking means. In the normal operation condition (FIG. 1), side pins 34 are engaged with the support 16 so as to prevent the hook 30 from accidentally rotating during handling and assembling steps. At the instant a frontal collision occurs, the side pins 34 are sheared off, allowing rotation of the hook 30 as discussed above.

As will be apparent, the geometry of the system shown in FIGS. 1 and 2 provides that the hinge point 15 between the bracket and the vehicle body is more advanced with respect to the centre of gravity of the bracket and the pedal. Therefore, once the pin 21 is released from the hook 30, the link unit formed by the bracket and the pedal will tend to fall down due to its own weight.

While a specific embodiment of the invention has been disclosed, it is to be understood that such disclosure has been merely for the purpose of illustration and that the invention is not to be limited in any manner thereby. Various modifications will be apparent to those skilled in the art in view of the foregoing example.

#### Claims

1. A system for releasing the brake pedal (10) in the event of a collision, characterised in that the pedal

is linked to the body (16) of the vehicle by a bracket (20), a lower portion of said bracket being hinged (15) to the body (16) of the vehicle, and an upper portion of the bracket being hooked to a hook member (30) in turn pivotally mounted at a first location (32) to the steering column (40) and secured at a second location (33) to the vehicle; said hook member (30) having a first, normal operation position in which it keeps the bracket (20) fixed, and a second position, rotated about said first pivotal connection (32) to the steering column (40) following a collision, in which said bracket (20) is released from the hook member (30) and is free to rotate about said hinged connection (15) to the vehicle, whereby the brake pedal (10) is free to rotate until it reaches the front body frame (17).

2. A system as claimed in claim 1, characterised in that when the brake pedal is pressed down, the pivotal connection (15) of the bracket (20) to the vehicle and the point (13) at which the brake pedal (10) is restrained to the servo brake control rod (14) lie on two respective horizontal, substantially coincident axes.
3. A system as claimed in claim 1, characterised in that the pivotal connection (15) of the bracket (20) to the vehicle is more advanced than the centre of gravity of the bracket (20) and the pedal (10).
4. A system as claimed in claim 1, characterised in that the bracket (20) is so shaped as to provide vertical walls (20a, 20b) located on either side of the brake pedal (10).
5. A system as claimed in claim 1, characterised in that said hook member (30) provides at least one yieldable locking means (34) which yields when subjected to a load exceeding about 30 kilograms, said locking means (34) normally engaging said support (16) and being adapted for collapsing in the event of a frontal collision to allow said rotation of the hook member (30).

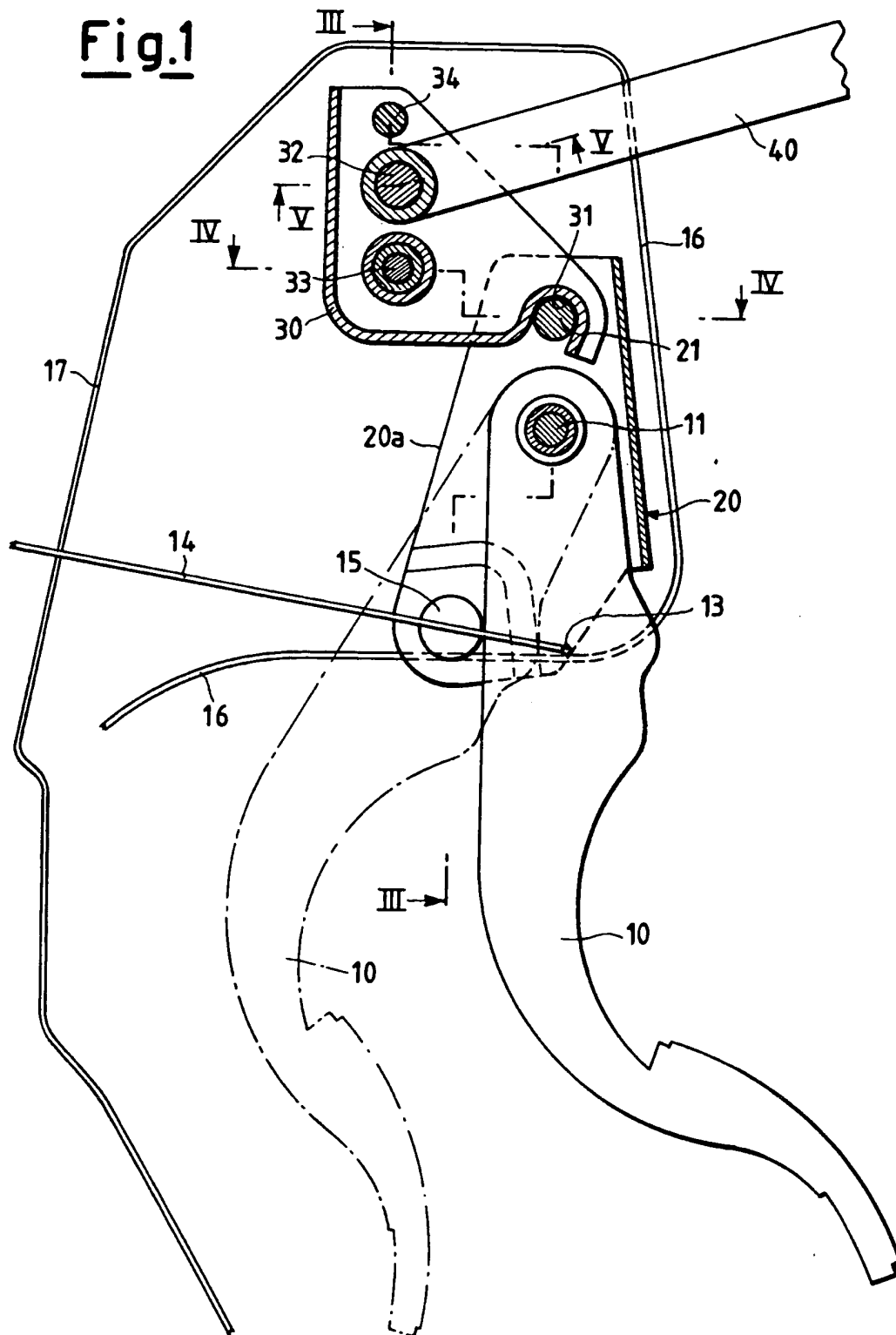
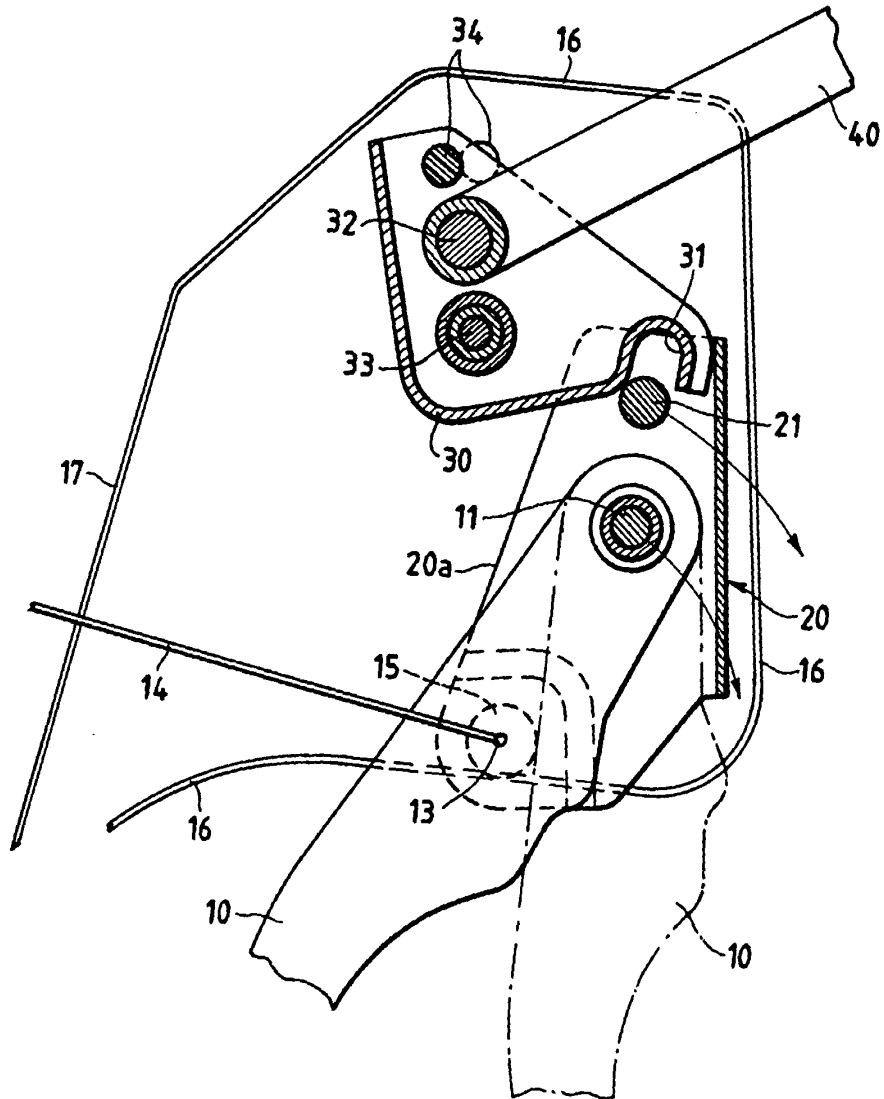
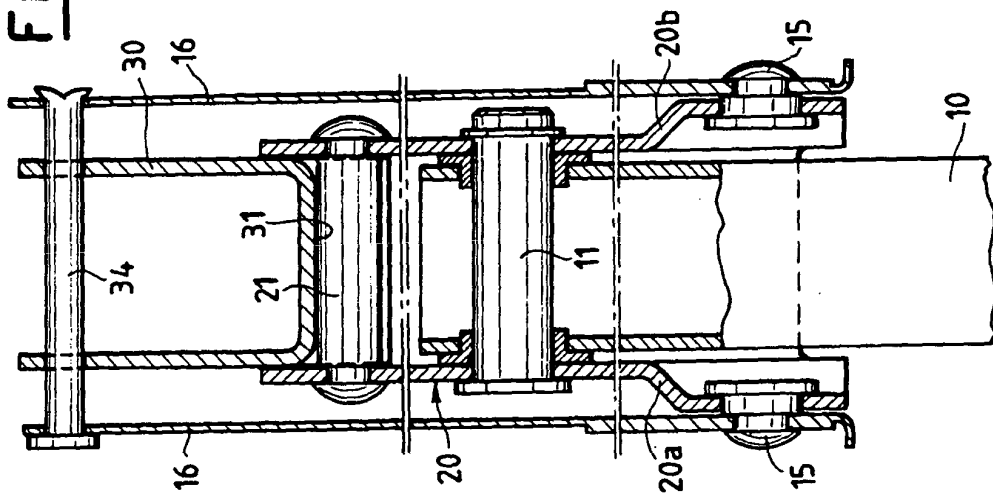


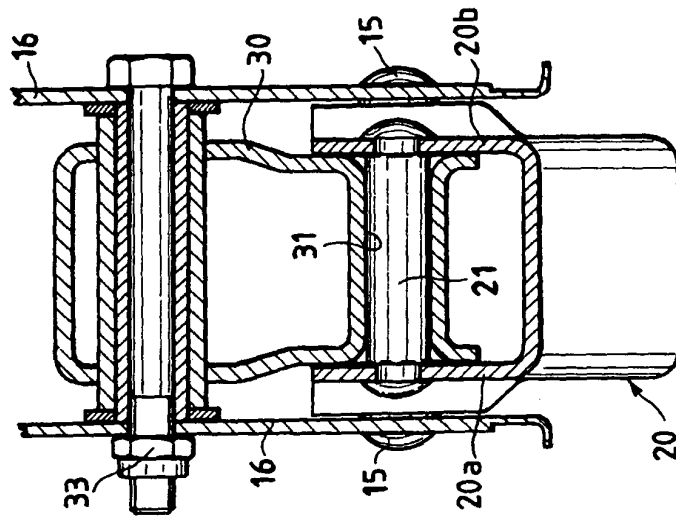
Fig.2



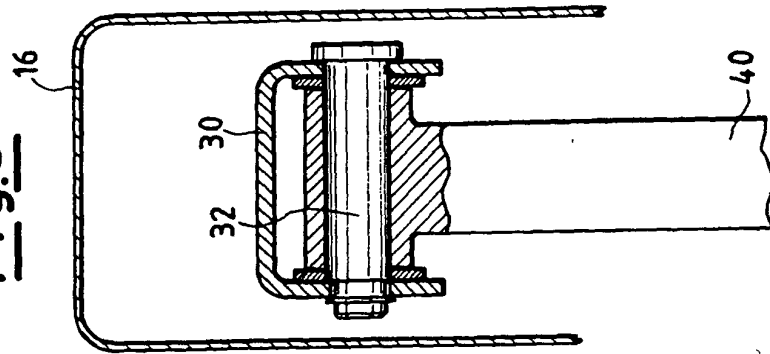
**Fig.3**



**Fig.4**



**Fig.5**





European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number

EP 97 11 3532

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.C1.6)
A,D	DE 44 09 235 A (VOLKSWAGEN AG) * column 2, line 58 - column 4, line 53; figures 1,2 *	1	B60T7/06 B60R21/09
A	DE 35 33 420 A (ADAM OPEL AG) * the whole document *	1	
A	DE 44 09 324 A (VOLKSWAGEN AG)		
			TECHNICAL FIELDS SEARCHED (Int.C1.6)
			B60T B60R
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>25 November 1997</b>	Examiner <b>Harteveld, C</b>
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>			

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